Laser Physics Letters 2016 vol.13 N2

First observation of optical gain on 5d-4f transitions of Ce^{3+} ions in up-conversionally pumped Ce^{3+}, Pr^{3+}:LiY0.3Lu0.7F4 mixed crystals

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Abstract

© 2016 Astro Ltd.The results of pump-probe experiments on the 5d-4f transitions of Ce3+ ions in up-conversionally pumped Ce3+, Pr3+:LiY0.3Lu0.7F4 crystals are presented and differential gain in the ultraviolet spectral range is demonstrated for the first time. The key parameters for the processes providing up-conversion pumping of the 5d states of Ce3+ ions in Ce3+, Pr3+:LiY0.3Lu0.7F4 mixed crystals via the 1D2 level of Pr3+ ions are estimated for the first time and the optimal pumping conditions are determined. The results of the pump-probe experiments and the mathematical modeling demonstrate that there are good prospects for the use of LiY0.3Lu0.7F4:Ce3+, Pr3+ crystals as an active medium of solid-state tunable UV lasers with up-conversion pumping.

http://dx.doi.org/10.1088/1612-2011/13/2/025802

Keywords

5d-4f transitions, rare earth ions, solid-state lasers, up-conversion